MEDICAL SCIENCE

Knowledge, attitude and practice toward organ and blood donation among military population of Tabuk city, KSA

Waleed Turki Mobarek Alanazi[1], **Bader Abdulrahman Husayyan Alanazi**[2], **Ahmed Hussain Ali Alshaikhi**[1], **Ahmed Yassin Alrefaei**[3], **Abdulaziz Nasser Saleh Albalawi**[4], **Omar Sabah Ayed Alzamhari**[4], **Qayed Fuhaiman Muslem Al-Balawi**[4], **Muteb Muflih Mohammed Alshahrani**[4]

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Authors' Affiliation:
[1]Family Medicine Senior Registrar, King Salman Armed Forces Hospital in Northwestern Region, Tabuk city, Kingdom of Saudi Arabia
[2]General Practitioner, King Salman Armed Forces Hospital in Northwestern Region, Tabuk city, Kingdom of Saudi Arabia
[3]Family Medicine Senior Registrar, King Salman Armed Forces Hospital in Northwestern Region, Tabuk city, Kingdom of Saudi Arabia
[4]Medical Student, Tabuk University, Tabuk city, Kingdom of Saudi Arabia

Contact List

Waleed Turki mobarek Alanazi	dr.waleed55@outlook.sa
Bader Abdulrahman Husayyan Alanazi	badr.115@hotmail.com
Ahmed Hussain Ali Alshaikhi	Ahmedhalshaikhi@gmail.com
Ahmed Yassin Alrefaei	ahmed94@live.com
Abdulaziz Nasser Saleh Albalawi	Donsouansaak@gmail.com
Omar Sabah Ayed Alzamhari	Omarzv1@gmail.com
Qayed Fuhaiman Muslem Al-Balawi	331000808@stu.ut.edu.sa
Muteb Muflih Mohammed Alshahrani	dr.mut33b@gmail.com

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ABSTRACT

Background: Organ donation is lifesaving procedure inpatients with end-stage organ failure. *Objective:* To evaluate the knowledge, attitudes and practice of the Military population in Tabuk, Saudi Arabia toward organ and blood donation. *Methodology:* This was a cross-sectional study conducted among the military population in Tabuk, Saudi Arabia. Participants completed a self-administrated questionnaire concerning blood and organ donation. *Results:* Among the participants, 58.3% had never donated blood, 13.9% had once, 11.1% twice and 1.9% many times. The following justifications for not donating blood were given; 19.4% of people express an unnamed dread of doing so, 15.7% of people are not aware of blood donation sites, 23.1% of people live in places remote from donation facilities, 34.3% do not have the free time and 19.4% of respondents worry about cleaning the equipment. Concerning the motivation; 96.3% of participants reported helping sick family or friends was their main motivation for giving blood. For 73.1% of the subjects, organ donation is important and 66.7% of the surveyed contributors think Islam supports organ transplantation but only 63% were aware of the Saudi Center for Organ donation. The majority (59.3%) of respondents want to donate their organs after death. *Conclusion:* The Saudi population had an uncertain understanding, attitude and practice of organ and blood donation. Future community-based studies should be carried out to ascertain what extra factors might affect someone's willingness to give blood and organs.

Keywords: Attitude, practice, organ and blood donation, Military population, Tabuk, Saudi Arabia.

1. INTRODUCTION

Organ donation is the gift of an organ to someone else who needs a transplant to help him to survive normally. There are two types of organ donation. The first is organ taken from a live donor. The second is cadaveric organ donation after death (Abolfotouh et al., 2014). The first resolution of the Islamic council (Senior Ulama Commission) in the Kingdom of Saudi Arabia (KSA) about organ donation and transplantation was issued in 1982. It permitted organ and tissue transplantation from both living and cadaveric donors. This resolution created an innovative epoch in organ transfer in Saudi Arabia, results in establishment of the Saudi Center of organ transplantation (SCOT) in 1984 (Baig et al., 2013).

Insufficiency of organ donation in Saudi Arabia is still a major barrier for transplantation despite the great efforts of motivation and education of public about organ donation (Jabri et al., 2016). In 2009, there were 6,000 sick Saudis across the Kingdom awaiting organ transplants (SCOT, 2009). Studies on knowledge and attitudes towards organ donation had revealed that the contribution of health care professionals in providing knowledge about organ donation and transplantation was very limited (Alghanim, 2010). Although, there is a considerable lack of knowledge, 74.1% of people are willing to donate (Baig et al., 2013) in disagreement with that, Alam, (2007) reported that several Saudi families are unwilling to donate organs and he attributed this to the understanding and religious principles which have a big impact on whether someone decides to give their organs after they pass away.

In a systematic review, Irving et al., (2012) found eight key variables that influence a person's judgment to donate their organs. Such as family opposition, doubts about the organ donation procedure, relationships, cultural influences, body integrity, communications with the health upkeep sector and the understanding of organ donation (Irving et al., 2012).

Blood donation is fundamental in saving lives. In KSA, the blood transfusion facility is basically a hospital-based blood banking system where blood banks are responsible for the service completely, including the donors` recruitment, testing donated blood for infection and the preparation, storage and issue of components (Fresh frozen plasma, platelet concentrate, packed RBCs, filtered products and cryoprecipitate) (Abdel-Gader et al., 2011; Hakami et al., 2022).

In KSA, tertiary care hospitals are providing highly specialized and free services, such as transplant surgeries, open heart surgery, cancer surgical treatment and blood to patients of bleeding and hematological disorders (Abdel-Gader et al., 2011). These services necessitate the continuous availability of blood supply from donors (Baig et al., 2011). In addition, road traffic accidents represent a major challenge for the blood donation facilities in KSA (Baig et al., 2011).

Throughout the world, the lone foundation of blood is blood donation; however, the recruitment of non-remunerated, voluntary donors is a major challenge (Misje et al., 2010). The rate of blood donation is high in high-income countries (39.2 per 1000 population) compared to middle (12.6 per 1000 population) and low-income countries (4 per 1000 population) as stated by the world Health Organization (WHO, 2020).

One of the important concerns in blood donation is the fact that only a relatively small percentage of the eligible population actually donate blood on unpaid system and regular basis and a significant percentage of them are delayed temporarily or permanently because of strict criteria being added for blood safety (Riley et al., 2007).

Numerous preceding studies steered in Saudi Arabia (Alfouzan, 2014; Asamoah-Akuoko et al., 2017; Kabrah et al., 2022) or on international level (Mohammed and Essel, 2018; Suemnig et al., 2017) have reported that people have inadequate knowledge, different attitudes, and several misconceptions regarding blood donation.

Study rationale

The number of deaths duo to organ failure are increasing worldwide and organ transplantation is a new modality of treatment which can save life but there are no sufficient organs duo to lack of public awareness and poor perception. The SCOT facilitates and organizes the processes of donation and transplantation but most of people do not know about it. The demand for blood and its products has progressively increased, particularly in developing countries. Despite of that, evidences indicate that there is a great shortage of blood and blood products in these countries and Saudi Arabia are not an exception. In KSA, there are relatively few voluntary blood donors; most probably due to lack of sufficient knowledge and prevalence of misconceptions regarding blood donation. Up to knowledge of the researcher, there is no previous study conducted in Tabuk city exploring the perception and attitude of the community toward organ and blood donation together.

Aim of the study

To assess the perception and attitude among the military population in Tabuk apropos blood as well as organ donation to formulate a base for further educational interventions to improve the perception towards blood as well as organ donation among them.

Specific objectives

1- To determine the armed forces community in Tabuk's perceptions and approaches to organ gift.

2- To evaluate attitudes towards blood donation among the military population in Tabuk.

3- To identify the factors that influence blood or organ donation acceptance or refusal among the military population in Tabuk.

2. METHODOLOGY

Study design

A cross sectional study design was adopted.

Study area and setting

The study was carried out at the King Salman Armed Forces Hospital in Northwestern Region, Tabuk city, Kingdom of Saudi Arabia. Tabuk city is located in the Northern region of Saudi Arabia.

Study period

The data was collected during a period of two months from November 1st to December 31st 2022.

Study population

All adult participants attending the Armed Forces Hospital in Northwestern Region, Tabuk city, Kingdom of Saudi Arabia. Throughout the period of the study were eligible for inclusion in the study, provided they fulfill the inclusion criteria.

Inclusion criteria

Age between 18 and 65 years

Both genders

Able to read and write independently

Saudi

Exclusion criteria

Older than 65 or younger than 18 years

Illiterate

Not consenting or willing to participate

Sample size

The minimum sample size for this study was decided according to Swinscow, as follows:

$$n = \frac{Z^2 \times P \times Q}{D^2}$$

Where:

n: Calculated sample size

Z: The z-value for the selected level of confidence (1- α) = 1.96.

P: An estimated prevalence of having positive attitude towards blood/organ donation as 50% since there is no specific figure for that

Q: (1 – 0.50) = 50%, i.e., 0.50

D: The maximum acceptable error = 0.05.

So, the planned least sample size was:

$$n = \frac{(1.96)^2 \times 0.50 \times 0.50}{(0.05)^2} = 384$$

The sampling technique

Systematic random sampling technique was followed, we included every 2nd individual attended the hospital during the study period.

Data collection tool

A self-administered questionnaire was used for data collection (Appendix 1). It was composed of three main sections. Section 1 will include socio-demographic characteristics of the participants (age, gender, marital status, educational level, occupation, residence and history of chronic diseases. The second sections will assess the practice, perception and attitude towards blood donation (13 items). It had been used previously in Jeddah, Saudi Arabia and proved to be valid (Baig et al., 2013). The third section will assess participants' awareness, perception as well as arrogance apropos organ donation during the life or after death (17 items). It had been validated and previously used (Al-Harthi and Alzahrany, 2015). Permission to utilize both questionnaires was asked from the two main authors through email.

Data collection technique

The researcher distributed the questionnaire on each selected patient in the chosen primary healthcare centers and explained to them the nature of the research and confidentiality of the information that given to them, then the consent was taken from them verbally.

Data management and analysis plan

All data was entered and analyzed using SPSS 23 with using appropriate statistical methods for description and analysis. P-value less than 0.05 were considered for statistical significance.

Ethical considerations

The research proposal was approved by the Regional Research and Ethics committee of the King Salman Armed Forces Hospital in Northwestern Region, Tabuk city, Kingdom of Saudi Arabia the approval was obtained with number (KSAFH-REC-2021-413).

3. RESULTS

In Table 1, the study included 432 participants, 59.3% of them were males and 40.7% were females. 59.3% were single and 39.8% were married. 87% of participants were university educated or more. 38% of participants work in government sector, 13% private sector and 40.7% had no job. 92.6% of participants live in urban area while 7.4% live in rural area.

As illustrated in Table 2, 5.6% of participants have hypertension, 2.8% diabetes and 1.9% asthma. 58.3% of participants never donated blood, 13.9% donated once, 11.1% donated twice and 1.9% donates regularly (Figure 1). Source of knowledge about blood and organ donation was social media in 29.6%, followed by family and friends 19.4% and blood bank workers in 9.3%.

Table 1 Socio-demographic characteristics of participants (n=432)

Parameter		No.	%
Gender	Male	256	59.3
	Female	176	40.7
Marital status	Single	256	59.3
	Married	172	39.8
	Divorced	4	9.
Educational level	Secondary	56	13.0
	University or more	376	87.0
Job	Government sector	164	38.0
	Private sector	56	13.0
	Military sector	36	8.3
	I don't have a job	176	40.7
Residence	Village (country)	32	7.4
	City (urban centre)	400	92.6

Table 2 Co-morbid diseases and basis of info around organ as well as blood donation among participants (n=432)

Parameter		No.	%
Co-morbid diseases	Diabetes	12	2.8
	Hypertension	24	5.6
	Asthma	8	1.9
	Other	32	7.4
	None	384	88.9
History of blood donation	Regularly	8	1.9
	Once	60	13.9
	Twice	48	11.1
	More than twice	64	14.8
	Never	252	58.3
Source of knowledge about blood and organ donation	Family and friends	84	19.4
	Blood bank workers	40	9.3
	Magazine or newspaper	4	.9
	Social media	128	29.6
	No specific source	176	40.7

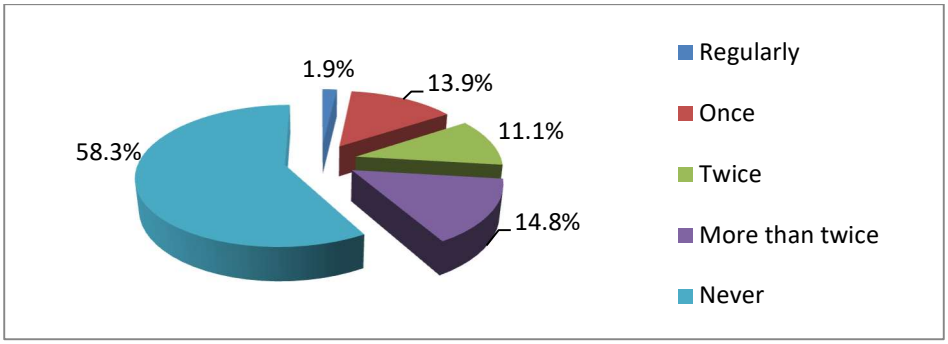

Figure 1 History of blood donation among the study participants

Blood donation

In Table 3, 14.8% of participants think that blood donor is at risk of catching the AIDS virus (HIV) or hepatitis B virus. 4.6% think that donating blood leads to fainting or death. 3.7% think that donating blood is a painful procedure. Causes of not donating blood were as followed, 19.4% have an unknown fear of donating blood. 15.7% not aware of where to donate blood. 23.1% live in place far away from donation centers. 34.3% do not have enough time to donate. 19.4% worried about sterilizing the equipment. 54.6% never been asked to donate. 26.9% do not have enough information about donating blood. 15.7% worried they will take a large amount of blood during the donation. 16.7% afraid of the sight of blood. 17.8% afraid of a needle prick. 25.9% are not eligible to donate blood for medical reasons. 13.9% think that donating blood is a long and tedious process. 7.4% worried about misuse of blood before it reaches a blood bank. 16.7% would like to donate blood if given a symbolic gift. 68.5% do not donate for religious reasons.

Table 3 Knowledge of participants of blood donation (n=432)

Parameter	Yes	No	Maybe
Offer a token gift/money to donors	56 13.0%	256 59.3%	120 27.8%
Importing blood from abroad	12 2.8%	332 76.9%	88 20.4%
The donor is at risk of catching the AIDS virus (HIV) or hepatitis B virus	64 14.8%	244 56.5%	124 28.7%
Donating blood leads to sterility and loss of vitality	0 0%	416 96.3%	16 3.7%

Donating blood leads to permanent weakness and anemia	0 0%	388 89.8%	44 10.2%
Donating blood leads to fainting or death	20 4.6%	296 68.5%	116 26.9%
Donating blood affects the physical strength of the body	16 3.7%	356 82.4%	60 13.9%
Donating blood is a painful procedure	16 3.7%	336 77.8%	80 18.5%
Donating blood is harmful to health	4 .9%	408 94.4%	20 4.6%

Table 4 Barriers for blood donation among study participants (n=432)

Parameter	Agree	Disagreed
I have an unknown fear of donating blood	84 19.4%	348 80.6%
I am not aware of where to donate blood	68 15.7%	364 84.3%
The blood donation place is far from where I live	100 23.1%	332 76.9%
I do not have enough time to donate	148 34.3%	284 65.7%
I am worried about sterilizing the equipment	84 19.4%	348 80.6%
No one has ever asked me to donate blood	236 54.6%	196 45.4%
I never thought about donating blood	124 28.7%	308 71.3%
I do not have enough information about donating blood	116 26.9%	316 73.1%
I think no blood is needed	36 8.3%	396 91.7%
I am worried they will take a large amount of blood during the donation	68 15.7%	364 84.3%
I am afraid of the sight of blood	72 16.7%	360 83.3%
I'm afraid of a needle prick	120 27.8%	312 72.2%
You are not eligible to donate blood for medical reasons	112 25.9%	320 74.1%
Donating blood is a long and tedious process	60 13.9%	372 86.1%
Misuse of my blood before in a blood bank	32 7.4%	400 92.6%
There is no specific reason	172 39.8%	260 60.2%
I would like to donate blood if given a symbolic gift	72 16.7%	360 83.3%
I will donate blood if family, relatives or friends need it	372 86.1%	60 13.9%

I will donate blood if a blood donation camp is organized on the university premises	248 57.4%	184 42.6%

Organ donation

Knowledge of organ donation was reported in Table 5 as, 73.1% of participants reported that organ donation is important. 66.7% contemplate that tissue donation is permitted in Islam. 49.1% of participants knew that there were places to register as a donor in my city. 38% know where to sign up as an organ donor. 63% heard about the Saudi Centre for Organ donation.

Mentality regarding organ giving was reported in Table 7 as, 15.7% of participants believe that organ giving causes physical deformity. 97.2% reported that organ gift keeps survives. Only 5.6% of participants donated organs before while 4.6% received donated organs. 44.4% have the desire to donate an organ before dying (Figure 2). 38% are willing to donate organs to their relatives only while 46.3% are willing to donate organs to strangers. 59.3% want to offer organs afterward demise. 55.6% encourage their family members to donate organs. 79.6% will look for a donor if they need an organ. 75.9% support organ donation from brain dead individuals.

Table 5 Motivations for blood donation among participants (n= 432)

Parameters	Agree	disagree
To help family or friends in need	416 96.3%	16 3.7%
Altruism	332 76.9%	100 23.1%
Personal requirement	272 63.0%	160 37.0%
Money/gift	64 14.8%	368 85.2%
To find out about my current HIV/AIDS/Hepatitis status	164 38.0%	268 62.0%
I would like to obtain a blood donation certificate	216 50.0%	216 50.0%
Religious reasons	296 68.5%	136 31.5%
Donating blood saves lives	416 96.3%	16 3.7%
There is no specific reason	228 52.8%	204 47.2%

Table 6 Knowledge of participants of organ donation (n=432)

Parameter	Yes	No	Maybe
Organ donation is important	316 73.1%	16 3.7%	100 23.1%
Organ donation is permitted in Islam	288 66.7%	20 4.6%	124 28.7%
There are places to register as a donor in my city	212 49.1%	48 11.1%	172 39.8%
I know where to sign up as an organ donor	164 38.0%	220 50.9%	48 11.1%
I heard about the Saudi Centre for Organ Donation	272 63.0%	116 26.9%	44 10.2%

Table 7 Attitude of participants towards organ donation (n=432)

Parameter	Agree	Disagree
Donating organs faults the person	68 15.7%	364 84.3%
Organ donation saves lives	420 97.2%	12 2.8%
Have you ever donated organs?	24 5.6%	408 94.4%
Have you ever donated organs as a recipient (recipient)?	20 4.6%	412 95.4%
Do you have the desire to donate an organ before dying?	192 44.4%	240 55.6%
I am willing to donate my organs to my relatives only	164 38.0%	268 62.0%
I am willing to donate my organs to strangers	200 46.3%	232 53.7%
Do you want to donate your organs after death?	256 59.3%	176 40.7%
I encourage my family members to donate organs	240 55.6%	192 44.4%
I will look for a donor if I need an organ	344 79.6%	88 20.4%
I support organ donation from brain dead individuals	328 75.9%	104 24.1%

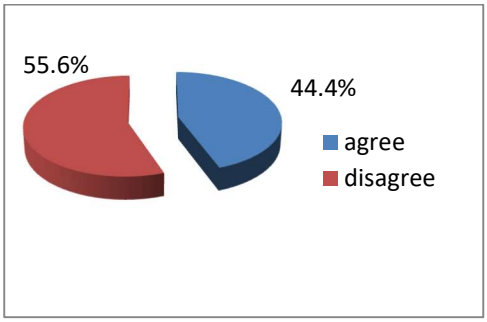

Figure 2 Desire to donate an organ before dying among the participants

4. DISCUSSION

The percentage of repeat donors is a measure of the effectiveness of blood donor recruiting efforts, which are necessary for attracting and keeping "safe" donors. It ranges from 1% to 70% (median 20%) in the least developed nations and from 85% to 85% (median 47%) in emerging nations, as opposed to values between 30% and 90% (median 88%) in developed nations (Riley et al., 2007).

According to our study results, 58.3% of participants never donated blood, 13.9% donated once, 11.1% donated twice and 1.9% donate regularly. This was comparable to results from a previous Saudi study reported 53.3% had previously donated blood; 39% of whom had donated more than once (Abolfotouh et al., 2014). In Jeddah, only 19%, 13% donated once and only 1% donating regularly (Baig et al., 2013).

In our study, 96.3% of participants donate blood to help family or friends in need. 76.9% donate for altruism, 63% for personal requirements, 14.8% donate for money or gift, 38% donate to find out about current HIV/AIDS/Hepatitis status, 50% would like to obtain a blood donation certificate, 68.5% donate for religious reasons and 96.3% donate blood saves lives. According to evidence from a review conducted in sub-Saharan Africa, generosity is the primary driver of donors returning to the area to make additional donations (Asamoah-Akuoko et al., 2017). Another study Mohammed and Essel, (2018) found that the main driver for all donor

groups was the desire to assist a family member or friend who was in need of blood, which is in contrast to studies from Germany (Suemnig et al., 2017), Saudi Arabia (Tariq et al., 2018) and Senegal (Jacobs and Berege, 1995). Unlike the donors in our study, altruistic donors are interested thru a wish to aid others and enhance the health of persons they may never meet (Alfouzan, 1995). A study in Riyadh, KSA reported that one day off (81.4%), movable donor caravans in public areas (79.1%), token gifts (31.5%) and lastly offering money (18.9%) were the three most influential motivators for donating blood (Alfouzan, 2014). In Jeddah, the main motivators for donors were to help family or friend (30%), saving others' lives (28%), religious reasons (20%) and altruism (12%) (Baig et al., 2013). In Pakistan, the main motivator among those donated blood was keeping survives of the persons (96%) (Ahmed et al., 2014).

According to a study in Riyadh, reasons for not giving blood included not thinking about it (52.4%), not possessing plenty of time to donate (45%) and having trouble finding a blood drive facility (41.3%). She came to the conclusion that individuals who were men, between the ages of 31 and 50, had greater levels of education and were in the armed forces were more probable to contribute blood (Alfouzan, 2014). Additional Saudi research revealed that males' main excuse for not providing blood was a privation of time, while females' main excuse was an unwillingness to get to the blood contribution centers in addition to a terror of anemia (Abolfotouh et al., 2014). In Pakistan, fear, the donation places are distant from the contributors' residence, not possessing plenty while to donate were the most frequent reasons for not donation (Ahmed et al., 2014). Fear, risk to health and physical harm from blood donation has featured frequently in many studies (Olaiya et al., 2004; Wiwanitkit, 2002; Atherley et al., 2016). In Mombatho, donation was found to be a health risk and there was also uncertainty whether donating blood is safe (Abdel-Gader et al., 2011). Correspondingly, in Tanzania, terror that blood contribution would infect with HIV and/or harm to healthiness was a common concern stated by individually givers plus condoners (Asamoah-Akuoko et al., 2017).

In our study, 86.1% of participants will donate blood if family, relatives or friends need it. In UK, utmost of contributors (79%) was eager to donate their blood if they have more information (Veld et al., 2019). In Pakistan, 50% of respondents displayed enthusiasm to give blood. In comparison to feminine gender, men were accompanying with satisfactory understanding, an optimistic assertiveness and a readiness to contribute blood (Ahmed et al., 2014).

Organ donation

Providing the fact that the SCOT has been a successful center for practically all forms of organ transplantation since its inception, the present research revealed that 63% of contributors were conscious with SCOT. This was lower than previously reported figure in another Saudi study as 70% of the study population was aware of the presence of an organ donor registration facility in Saudi Arabia (Somaili et al., 2022). This finding is higher than the awareness level of the Moroccan study population, which showed that 51% were aware of the existence of these centers (Mohamed and Guella, 2013). A cross-sectional study of adult Saudi men was conducted during 2005 in various regions of Saudi Arabia. The research discovered that 58.5% of contributors overheard around the presence of SCOT (Alam, 2007).

In our study, 44.4% have the desire to donate an organ before dying. 38% are willing to donate organs to their relatives only while 46.3% are willing to donate organs to strangers. 59.3% intended to give organs afterward demise. According to a research investigation carried out in Saudi Arabia's Western Area, 73.5% of the people surveyed were ready to give their organs, with no discernible gender differences (Alam, 2007). Another Saudi research found that 74.1% of contributors would be open to giving their body parts, thru not any discernible gender variances (Jabri et al., 2016). Nearly 30.3% of Taif defendants said they would be ready to contribute body parts, compared to 59.3% who said they would not (Al-Harthi and Alzahrany, 2015). A study in different regions in KSA reported that 42% of the defendants decided to contribute their body parts afterward decease (Alam, 2007). Another Saudi study reported that 66.7% of urban areas expressed willingness to donate an organ than those in the rural areas 42.8%. The vast majority of defendants were eager to give afterward their demise only. However, 34.8% of defendants in the country parts were eager to contribute throughout existence or life (Alghanim, 2010).

In our study, 15.7% of participants think that organ donation disfigures the body. In previous literature, the most frequent barriers of organ donation were privation of attentiveness (21.7%), family rejection (20.6%) in addition and terror of indefinite (19.7%) (Jabri et al., 2016). In Taif, fear of subsequent problems and deficiency of appropriate post-donation precaution were the chief described explanations for unwillingness of organ gift (Al-Harthi and Alzahrany, 2015). Another Saudi study reported that, amongst the several explanations in contradiction of organ gift, 27.5% dreaded that the performance of organ donation controverted their religious principles, whereas 3.5% supposed that there was definitely no value to organ donation (Alam, 2007). The respondents of another study on condition that different motives constraining them from body parts contribution. In the rural areas,

they reported "worries about receiving inadequate health care after donation", "lack of family support" and "lack of information about organ donation" while, in the urban areas "lack incentives" (Alghanim, 2010).

In our study, 66.7% of participants reported that organ donation is permitted in Islam. A previous survey found that just 39% of the people viewed religion as a barrier to organ donation and refused to donate on this basis (Cotrau et al., 2019). Like results were established in research showed at the Dhahran Military Hospital, as 68.6% of contributors supposed organ gift was lawful whereas just 26.2% thought it was against Islamic tradition (Padela and Auda, 2020). Just 10% of individuals who responded to the survey in Kuala Lumpur, according to another study, said they would not donate their organs because of their religious convictions (Tumin et al., 2013; Rasiah et al., 2016). As a result, the religious barrier becomes less and less of an actual barrier as people get more educated. Instead, it is perceived as saving countless lives and helping others, which is in line with Islamic teachings of helping others (Mostafazadeh-Bora and Zarghami, 2017). According to the Holy Quran and Sunna, Islam urges individuals to help one another and save lives. Research that mainly targeted Catholic Christians looked into the barriers to organ donation. According to the research, 17% of respondents said they would not give due to their spiritual principles, while 10% said religion had no influence on their choices (Islam, 2021).

Currently, the Saudi Centre for Organ Transfer is a key player in all facets of transplantation in Saudi Arabia, including allocation, coordination and procurement as well as teaching at all levels. The Saudi Arabian practice of organ gift and transfer is governed by a directory that SCOT has produced.

5. CONCLUSION

Saudi population exhibited moderate knowledge, attitude and practice levels toward organ and blood donation. To gather more data from various population groups, future researchers should carry out a study like this in a community environment. To find out what other factors might affect someone's willingness to donate their blood and organs, it is important to look at additional demographic aspects that may have an impact.

Acknowledgement

The authors thank the participants who were all contributed samples to the study.

Author Contributions

All of the authors contributed equally in manuscript work & production.

Ethical approval

The study was approved by the Medical Ethics Committee of the King Salman Armed Forces Hospital in Northwestern Region, Tabuk city, Kingdom of Saudi Arabia. The approval was obtained with number (KSAFH-REC-2021-413).

Informed consent

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Funding

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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